

REMARKS/ARGUMENTS

Claims 1-22 were pending in the present application. The present response amends claims 9, 13-16, 18-20 and 22; and cancels claims 1-8; leaving pending in the application claims 9-22. Reconsideration of the rejected claims is respectfully requested.

I. Rejection under 35 U.S.C. §112

Claims 1-22 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Particularly, the use of the term “matrix” is rejected as being unclear. Although it is respectfully submitted that the use of the term matrix would be obvious to one of ordinary skill in the art in light of the specification, the claims have been amended in order to expedite issuance of the pending claims and no longer contain the term at issue. Claims 14, 15, and 19 have further been amended for purposes of clarity and should be sufficiently definite. Applicants therefore respectfully submit that the pending claims are sufficiently definite and respectfully request that this rejection be withdrawn.

II. Rejection under 35 U.S.C. §103**a. *Blais***

Claims 15-16, 18 and 22 are rejected under 35 U.S.C. §103(a) as being obvious over *Blais* (US 5,457,299). Claim 15 requires a method of encapsulating an electronic component supported on a substrate, defined by:

- providing a diode-laser array for delivering radiation laser radiation having a wavelength between about 600 and 1000 nm;

- providing a **thermally curable liquid epoxy compound having included therein at least one material that is strongly absorbing for the wavelength of the laser radiation;**

- depositing on the electronic component a sufficient amount of said liquid epoxy compound to form a layer thereof covering the component;

- transporting said laser radiation from said diode-laser array, via an optical fiber bundle, to an optical projector for projecting said laser radiation; and

- projecting said laser radiation onto said layer of liquid epoxy compound for a time period sufficient that the light absorbing material absorbs a portion of the laser radiation and generates heat in the layer whereby the liquid epoxy compound is cured**

(*emphasis added*). *Blais* does not teach or suggest such limitations. *Blais* teaches a method of “encapsulating a semiconductor chip” by heating the backside of the chip “with a laser pulse” such that the “heat generated by the laser pulse” conducts “through the chip” to cure “the encapsulant” (col. 1, lines 53-65). *Blais* does not teach or suggest projecting radiation onto an epoxy compound, as the system of *Blais* irradiates the opposite side of the chip. *Blais* also fails to teach or suggest a light-absorbing material that absorbs laser radiation and generates heat to cure the epoxy compound. As *Blais* fails to teach or suggest these required limitations, *Blais* cannot render claim 15 obvious. Claims 16 and 18 depend from claim 15 and also thus are not rendered obvious.

Claim 22 requires a method of encapsulating an electronic component supported on a substrate, defined by:

depositing on the electronic component a thermally curable liquid epoxide layer including therein at least one light absorbing material; and
irradiating the epoxide layer with laser light generated by a laser diode array and having a wavelength between 600 and 100nm, the epoxide layer being formulated so that at least 15% of the radiation striking the epoxide layer is absorbed by the at least one light absorbing material in a manner to heat and cure the epoxide layer.

(*emphasis added*). As discussed above with respect to claim 15, *Blais* does not expose the encapsulate to laser radiation, but instead conducts heat through the chip by irradiating the backside of the chip. *Blais* does not teach or suggest using an epoxide layer including at least one light absorbing material, or a light absorbing material that absorbs laser light in a manner to heat and cure the epoxide layer. As such, *Blais* cannot render claim 22 obvious.

Applicants therefore respectfully request that the rejection with respect to claims 15-16, 18 and 22 be withdrawn.

b. *Brunner*

The Office Action on page 5 cites the *Brunner* reference (DE 5,457,299) under the obviousness section, but does not cite specifics for the rejection. Applicants appreciate the Examiner sending a copy of the English translation of *Brunner* after issuance of the present Office Action. After reviewing the full translation, it is respectfully submitted that *Brunner* would not render the claims of the present invention obvious, as *Brunner* is directed to a “light-hardenable plastic” used to cover an electronic device on a semiconductor (page 2 of English translation by the Ralph McElroy

Translation Company provided by the USPTO). The use of a light-hardenable plastic was intended to avoid a thermal process as claimed in the present invention, in order to reduce thermal stresses (p. 2). *Brunner* does not teach or suggest the inclusion of a light-absorbing material in an epoxy compound for absorbing laser light and generating heat in order to cure the epoxy, and in fact teaches away from such thermal processes. As such, *Brunner* cannot render the pending claims obvious.

c. *Kuizenga*

Kuizenga (US 6,007,664) is cited under the obviousness section, without specifics, as showing a laser-induced thermal curing process for epoxy “for slider head/suspension assemblies.” Such teaching does not render the pending claims obvious, and is non-analogous prior art. Further, *Kuizenga* applies localized heating using a focused laser beam (col. 6, lines 56-65; col. 7, lines 25-30), and does not utilize a light absorbing material to absorb the laser radiation and generate heat. As such, *Kuizenga* cannot render the pending claims obvious, either alone or in combination with either *Blais* or *Brunner*.

d. *Brunner, Schoen, and Gelbart*

Claims 1-7, 9-11, and 13-22 are rejected under 35 U.S.C. §103(a) as being obvious over *Brunner* in view of *Schoen* (US 5,242,715) and *Gelbart* (US 6,214,276 B1). Claims 1-7 have been canceled.

Claim 9 requires a method of encapsulating an electronic component supported on a substrate, defined by:

depositing an amount of thermally curable epoxy compound on the electronic component sufficient to form a layer thereof covering the component, the epoxy compound having included therein at least one light absorbing material; and
directing laser radiation having a wavelength between about 600 and 1000 nm onto the layer of thermally curable epoxy compound for a time period sufficient that the light absorbing material absorbs a portion of the laser radiation and generates heat in the layer whereby the epoxy compound is cured.

(*emphasis added*). Such limitations are not rendered obvious by *Brunner, Schoen, and Gelbart*.

As discussed above, *Brunner* teaches using a “light-hardenable plastic” to cover an electronic device on a semiconductor, whereby a thermal process such as that recited in claim 9 is avoided. *Brunner* therefore does not render claim 9 obvious.

Schoen does not make up for the deficiencies in *Brunner* with respect to claim 9. *Schoen* teaches that “with the process according to the invention, the reaction resin mixtures are hardened both through UV radiation and also thermally,” where the “thermal hardening takes place advantageously at temperatures from 80° to 200° C.; preferably at temperatures from 80° to 200° C” (col. 3, lines 33-39). As *Brunner* uses light-hardenable plastic to avoid thermal processes, there would be no motivation to combine the teachings of *Schoen* and *Brunner*. Further, *Schoen* does not teach or suggest the use of wavelengths between about 600 and 100 nm as required by claim 9, such that *Schoen* cannot render claim 9 obvious alone or in combination with *Brunner*. Further, *Schoen* teaches a combination of radiation and thermal heating, which is not necessary in the invention of claim 9.

Gelbart teaches the generation of three-dimensional objects “by imaging a liquid resin” with a laser whereby the irradiated portion of the resin “gets sufficiently hot to polymerize” (col. 1, lines 13-17; col. 2, lines 23-41; col. 3, lines 14-16). As such, *Gelbart* is non-analogous prior art. Further, there would be no motivation to combine the thermal heating process of *Gelbart* with the thermal process-avoiding, light-hardenable plastic process of *Brunner*. *Brunner* therefore cannot render obvious claim 9, or dependent claims 10-11 and 13-14, either alone or in combination with *Brunner* and *Schoen*.

Claims 15 and 22 are discussed above. Each of these claims, as well as claim 19, requires encapsulating an electronic component by irradiating an epoxy compound containing at least one light absorbing material with laser radiation at a wavelength between about 600 nm and about 1000 nm, such that the light absorbing material generates heat for curing the epoxy compound. As discussed with respect to claim 9, such limitations are not rendered obvious by the combination of *Brunner*, *Schoen*, and *Gelbart*. Claims 16-18 and 20-21 depend from these claims and also are not rendered obvious.

e. *Brunner, Schoen, Gelbart, and Busman*

Claims 8 and 12 are rejected under 35 U.S.C. §103(a) as being obvious over *Brunner* in view of *Schoen* and *Gelbart* (US 6,214,276 B1), and further in view of *Busman* (US 5,756,689).

Claim 8 has been canceled, and claim 12 depends from claim 9. As discussed above, claim 9 is not rendered obvious by the combination of *Brunner*, *Schoen*, and *Gelbart*. *Busman* does not make up for the deficiencies in these references with respect to claim 9, as *Busman* is cited only as teaching “use of metal particulates” in encapsulating material (OA pp. 7-8; col. 1, lines 16-30). *Busman* is directed to laser induced thermal imaging, and as such is non-analogous prior art. Further, there would be no motivation to combine the thermal process of *Busman* with the thermal-process avoiding system of *Brunner*. As such, *Busman* cannot render obvious claim 9, and dependent claim 12, either alone or in combination with *Brunner*, *Schoen*, and *Gelbart*.

Applicants therefore respectfully request that the rejection with respect to claims 9-11, and 13-22 be withdrawn.

III. Amendment to the Claims

Unless otherwise specified, amendments to the claims are made for purposes of clarity, and are not intended to alter the scope of the claims or limit any equivalents thereof. The amendments are supported by the specification and do not add new matter to the specification.

IV. Conclusion

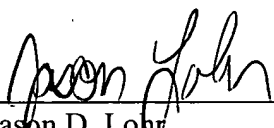
In view of the above, it is respectfully submitted that the application is now in condition for allowance. Reconsideration of the pending claims and a notice of allowance is respectfully requested.

The Commissioner is hereby authorized to charge any deficiency in the fees filed, asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-1703, under Order No. COHD-4540. **A duplicate copy of the transmittal cover sheet attached to this Response to Office Action Mailed April 26, 2004, is provided herewith.**

Respectfully submitted,

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